**ΠΑΝΕΠΙΣΤΗΜΙΟ ΔΥΤΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ**

**ΠΑΙΔΑΓΩΓΙΚΟ ΤΜΗΜΑ ΔΗΜΟΤΙΚΗΣ ΕΚΠΑΙΔΕΥΣΗΣ**

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| **ECOLOGY** |

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| **ΠΛΗΡΟΦΟΡΙΚΗ ΚΑΙ ΝΕΕΣ ΤΕΧΝΟΛΟΓΙΕΣ ΣΤΗΝ ΕΚΠΑΙΔΕΥΣΗ** |
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| **ΜΑΪΝΑ ΚΥΡΙΑΚΗ** |
| **ΑΕΜ: 4470** |
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| **26/3/2018** |

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# Conservation biology

Conservation biology is the management of nature and of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction and the erosion of biotic interactions.[1][2][3] It is an interdisciplinary subject drawing on real and anthropology sciences, and the practice of natural resource management.

## Origins

The term conservation biology and its conception as a new field originated with the convening of "The First International Conference on Research in Conservation Biology" held at the University of California, San Diego in La Jolla, California in 1978 led by American biologists Bruce A. Wilcox and Michael E. Soulé with a group of leading university and zoo researchers and conservationists including Kurt Benirschke, Sir Otto Frankel, Thomas Lovejoy, and Jared Diamond. The meeting was prompted by the concern over tropical deforestation, disappearing species, eroding genetic diversity within species.[8] The conference and proceedings that resulted[2] sought to initiate the bridging of a gap between theory in ecology and evolutionary genetics on the one hand and conservation policy and practice on the other.[9] Conservation biology and the concept of biological diversity (biodiversity) emerged together, helping crystallize the modern era of conservation science and policy. The inherent multidisciplinary basis for conservation biology has led to new subdisciplines including conservation social science, conservation behavior and conservation physiology.[10] It stimulated further development of conservation genetics which Otto Frankel had originated first but is now often considered a subdiscipline as well.

## Description

The rapid decline of established biological systems around the world means that conservation biology is often referred to as a "Discipline with a deadline".[11] Conservation biology is tied closely to ecology in researching the population ecology (dispersal, migration, demographics, effective population size, inbreeding depression, and minimum population viability) of rare or endangered species.[12][13] Conservation biology is concerned with phenomena that affect the maintenance, loss, and restoration of biodiversity and the science of sustaining evolutionary processes that engender genetic, population, species, and ecosystem diversity.[5][6][7][13] The concern stems from estimates suggesting that up to 50% of all species on the planet will disappear within the next 50 years,[14] which has contributed to poverty, starvation, and will reset the course of evolution on this planet.[15][16]

Conservation biologists research and educate on the trends and process of biodiversity loss, species extinctions, and the negative effect these are having on our capabilities to sustain the well-being of human society. Conservation biologists work in the field and office, in government, universities, non-profit organizations and industry. The topics of their research are diverse, because this is an interdisciplinary network with professional alliances in the biological as well as social sciences. Those dedicated to the cause and profession advocate for a global response to the current biodiversity crisis based on morals, ethics, and scientific reason. Organizations and citizens are responding to the biodiversity crisis through conservation action plans that direct research, monitoring, and education programs that engage concerns at local through global scales.

# Natural resource management

Natural resource management refers to the management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations (stewardship).

Natural resource management deals with managing the way in which people and natural landscapes interact. It brings together land use planning, water management, biodiversity conservation, and the future sustainability of industries like agriculture, mining, tourism, fisheries and forestry. It recognises that people and their livelihoods rely on the health and productivity of our landscapes, and their actions as stewards of the land play a critical role in maintaining this health and productivity.[1]

Natural resource management specifically focuses on a scientific and technical understanding of resources and ecology and the life-supporting capacity of those resources.[2] Environmental management is also similar to natural resource management. In academic contexts, the sociology of natural resources is closely related to, but distinct from, natural resource management.

## History

The Bureau of Land Management in the United States manages America's public lands, totaling approximately 264 million acres (1,070,000 km2) or one-eighth of the landmass of the country.

The emphasis on sustainability can be traced back to early attempts to understand the ecological nature of North American rangelands in the late 19th century, and the resource conservation movement of the same time.[3][4] This type of analysis coalesced in the 20th century with recognition that preservationist conservation strategies had not been effective in halting the decline of natural resources. A more integrated approach was implemented recognising the intertwined social, cultural, economic and political aspects of resource management.[5] A more holistic, national and even global form evolved, from the Brundtland Commission and the advocacy of sustainable development.

In 2005 the government of New South Wales, established a Standard for Quality Natural Resource Management,[6] to improve the consistency of practice, based on an adaptive management approach.

In the United States, the most active areas of natural resource management are wildlife management often associated with ecotourism and rangeland management. In Australia, water sharing, such as the Murray Darling Basin Plan and catchment management are also significant.

## Ownership regimes

Natural resource management approaches can be categorised according to the kind and right of stakeholders, natural resources:

State property: Ownership and control over the use of resources is in hands of the state. Individuals or groups may be able to make use of the resources, but only at the permission of the state. National forest, National parks and military reservations are some US examples.

Private property: Any property owned by a defined individual or corporate entity. Both the benefit and duties to the resources fall to the owner(s). Private land is the most common example.

Common property: It is a private property of a group. The group may vary in size, nature and internal structure e.g. indigenous neighbours of village. Some examples of common property are community forests.

Non-property (open access): There is no definite owner of these properties. Each potential user has equal ability to use it as they wish. These areas are the most exploited. It is said that "Everybody's property is nobody's property". An example is a lake fishery. Common land may exist without ownership, in which case in the UK it is vested in a local authority.

Hybrid: Many ownership regimes governing natural resources will contain parts of more than one of the regimes described above, so natural resource managers need to consider the impact of hybrid regimes. An example of such a hybrid is native vegetation management in NSW, Australia, where legislation recognises a public interest in the preservation of native vegetation, but where most native vegetation exists on private land.[7]

# Urban ecology

Urban ecology is the scientific study of the relation of living organisms with each other and their surroundings in the context of an urban environment. The urban environment refers to environments dominated by high-density residential and commercial buildings, paved surfaces, and other urban-related factors that create a unique landscape dissimilar to most previously studied environments in the field of ecology.[1]

Urban ecology is a recent field of study compared to ecology as a whole. The methods and studies of urban ecology are similar to and comprise a subset of ecology. The study of urban ecology carries increasing importance because more than 50% of the world's population today lives in urban areas.[2] At the same time, it is estimated that within the next forty years, two-thirds of the world's population will be living in expanding urban centers.[3] The ecological processes in the urban environment are comparable to those outside the urban context. However, the types of urban habitats and the species that inhabit them are poorly documented. Often, explanations for phenomena examined in the urban setting as well as predicting changes because of urbanization are the center for scientific research.[1]

## History

Ecology has historically focused on "pristine" natural environments, but by the 1970s many ecologists began to turn their interest towards ecological interactions taking place in, and caused by urban environments. Jean-Marie Pelt's 1977 book The Re-Naturalized Human,[4] Brian Davis' 1978 publication Urbanization and the diversity of insects,[5] and Sukopp et al.'s 1979 article "The soil, flora and vegetation of Berlin's wastelands"[6] are some of the first publications to recognize the importance of urban ecology as a separate and distinct form of ecology the same way one might see landscape ecology as different from population ecology. Forman and Godron's 1986 book Landscape Ecology[7] first distinguished urban settings and landscapes from other landscapes by dividing all landscapes into five broad types. These types were divided by the intensity of human influence ranging from pristine natural environments to urban centers.

Urban ecology is recognized as a diverse and complex concept which differs in application between North America and Europe. The European concept of urban ecology examines the biota of urban areas, while the North American concept has traditionally examined the social sciences of the urban landscape,[8] as well as the ecosystem fluxes and processes.[9]

## Methods

Since urban ecology is a subfield of ecology, many of the techniques are similar to that of ecology. Ecological study techniques have been developed over centuries, but many of the techniques use for urban ecology are more recently developed. Methods used for studying urban ecology involve chemical and biochemical techniques, temperature recording, heat mapping remote sensing, and long-term ecological research sites.

Chemical and biochemical techniques

Chemical techniques may be used to determine pollutant concentrations and their effects. Tests can be as simple as dipping a manufactured test strip, as in the case of pH testing, or be more complex, as in the case of examining the spatial and temporal variation of heavy metal contamination due to industrial runoff.[10] In that particular study, livers of birds from many regions of the North Sea were ground up and mercury was extracted. Additionally, mercury bound in feathers was extracted from both live birds and from museum specimens to test for mercury levels across many decades. Through these two different measurements, researchers were able to make a complex picture of the spread of mercury due to industrial runoff both spatially and temporally.

Other chemical techniques include tests for nitrates, phosphates, sulfates, etc. which are commonly associated with urban pollutants such as fertilizer and industrial byproducts. These biochemical fluxes are studied in the atmosphere (e.g. greenhouse gasses), aquatic ecosystems and soil vegetation.[11] Broad reaching effects of these biochemical fluxes can be seen in various aspects of both the urban and surrounding rural ecosystems.

Temperature data and heat mapping

Temperature data can be used for various kinds of studies. An important aspect of temperature data is the ability to correlate temperature with various factors that may be affecting or occurring in the environment. Oftentimes, temperature data is collected long-term by the Office of Oceanic and Atmospheric Research (OAR), and made available to the scientific community through the National Oceanic and Atmospheric Administration (NOAA).[12] Data can be overlaid with maps of terrain, urban features, and other spatial areas to create heat maps. These heat maps can be used to view trends and distribution over time and space.[12][13]

Remote sensing

Remote sensing allows collection of data using satellites. This map shows urban tree canopy in Boston.

Remote sensing is the technique in which data is collected from distant locations through the use of satellite imaging, radar, and aerial photographs. In urban ecology, remote sensing is used to collect data about terrain, weather patterns, light, and vegetation. One application of remote sensing for urban ecology is to detect the productivity of an area by measuring the photosynthetic wavelengths of emitted light.[14] Satellite images can also be used to detect differences in temperature and landscape diversity to detect the effects of urbanization.[13]

LTERs and long-term data sets

Long-term ecological research (LTER) sites are research sites funded by the government that have collected reliable long-term data over an extended period of time in order to identify long-term climatic or ecological trends. These sites provide long-term temporal and spatial data such as average temperature, rainfall and other ecological processes. The main purpose of LTERs for urban ecologists is the collection of vast amounts of data over long periods of time. These long-term data sets can then be analyzed to find trends relating to the effects of the urban environment on various ecological processes, such as species diversity and abundance over time.[14] Another example is the examination of temperature trends that are accompanied with the growth of urban centers.[15]

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| LESSON | TOPIC | ASSIGNMENT | Points | DUE |
| 1 | What is Distance Learning? | Wiki #1 | 10 | March 10 |
| Presentation | 20 |  |
| 2 | History & Theories |  | 20 | March 24 |
| Spring Break | | | | |
| 3 | Distance Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog #1 | 10 | April 21 |

# Community health

Community health is a major field of study within the medical and clinical sciences which focuses on the maintenance, protection and improvement of the health status of population groups and communities as opposed to the health of individual patients[citation needed]. It is a distinct field of study that may be taught within a separate school of public health or environmental health. The WHO defines community health as:

environmental, social, and economic resources to sustain emotional and physical well being among people in ways that advance their aspirations and satisfy their needs in their unique environment.[1]

Community health, unlike public health, tends to focus more on a defined geographical community. The health characteristics of a community are often examined using geographic information system (GIS) software and public health datasets. Some projects, such as InfoShare or GEOPROJ combine GIS with existing datasets, allowing the general public to examine the characteristics of any given community in participating countries.

Medical interventions that occur in communities can be classified as three categories: primary healthcare, secondary healthcare, and tertiary healthcare. In the United States, community health is rooted within primary healthcare achievements.[2] Primary healthcare programs aim to reduce risk factors and increase health promotion and prevention. Secondary healthcare is related to "hospital care" where acute care is administered in a hospital department setting. Tertiary healthcare refers to highly specialized care usually involving disease or disability management.

The success of community health programmes relies upon the transfer of information from health professionals to the general public using one-to-one or one to many communication (mass communication). The latest shift is towards health marketing.

## Measuring community health

Community health is generally measured by geographical information systems and demographic data. Geographic information systems can be used to define sub-communities when neighborhood location data is not enough.[3] Traditionally community health has been measured using sampling data which was then compared to well-known data sets, like the National Health Interview Survey or National Health and Nutrition Examination Survey.[4] With technological development, information systems could store more data for small scale communities, cities, and towns; as opposed to census data that only generalizes information about small populations based on the overall population. Geographical information systems (GIS) can give more precise information of community resources, even at neighborhood levels.[5] The ease of use of geographic information systems (GIS), advances in multilevel statistics, and spatial analysis methods makes it easier for researchers to procure and generate data related to the built environment.[6]

Social media can also play a big role in health information analytics.[7] Studies have found social media being capable of influencing people to change their unhealthy behaviors and encourage interventions capable of improving health status.[7] Social media statistics combined with geographical information systems (GIS) may provide researchers with a more complete image of community standards for health and well being.[8][9]

## Challenges and difficulties with community health

The complexity of community health and its various problems can make it difficult for researchers to assess and identify solutions. Community-based participatory research (CBPR) is a unique alternative that combines community participation, inquiry, and action.[16] Community-based participatory research (CBPR) helps researchers address community issues with a broader lens and also works with the people in the community to find culturally sensitive, valid, and reliable methods and approaches.[16]

Other issues involve access and cost of medical care. A great majority of the world does not have adequate health insurance.[17] In low-income countries, less than 40% of total health expenditures are paid for by the public/government.[17] Community health, even population health, is not encouraged as health sectors in developing countries are not able to link the national authorities with the local government and community action.[17]

In the United States, the Affordable Care Act (ACA) changed the way community health centers operate and the policies that were in place, greatly influencing community health.[18] The ACA directly affected community health centers by increasing funding, expanding insurance coverage for Medicaid, reforming the Medicaid payment system, appropriating $1.5 billion to increase the workforce and promote training.[18] The impact, importance, and success of the Affordable Care Act is still being studied and will have a large impact on how ensuring health can affect community standards on health and also individual health.

# Ecological economics

Ecological economics (also called eco-economics, ecolonomy or bioeconomics of Georgescu-Roegen) is both a transdisciplinary and an interdisciplinary field of academic research addressing the interdependence and coevolution of human economies and natural ecosystems, both intertemporally and spatially.[1] By treating the economy as a subsystem of Earth's larger ecosystem, and by emphasizing the preservation of natural capital, the field of ecological economics is differentiated from environmental economics, which is the mainstream economic analysis of the environment.[2] One survey of German economists found that ecological and environmental economics are different schools of economic thought, with ecological economists emphasizing strong sustainability and rejecting the proposition that natural capital can be substituted by human-made capital (see the section on Weak versus strong sustainability below).[3]

Ecological economics was founded in the 1980s as a modern discipline on the works of and interactions between various European and American academics (see the section on History and development below). The related field of green economics is, in general, a more politically applied form of the subject.[4][5]

According to ecological economist Malte Faber, ecological economics is defined by its focus on nature, justice, and time. Issues of intergenerational equity, irreversibility of environmental change, uncertainty of long-term outcomes, and sustainable development guide ecological economic analysis and valuation.[6] Ecological economists have questioned fundamental mainstream economic approaches such as cost-benefit analysis, and the separability of economic values from scientific research, contending that economics is unavoidably normative rather than positive (i.e. descriptive).[7] Positional analysis, which attempts to incorporate time and justice issues, is proposed as an alternative.[8][9] Ecological economics shares many of its perspectives with feminist economics, including the focus on sustainability, nature, justice and care values.[10]

## History and development

The first principles, deriving from the radiochemist FA Soddy, were laid out in his 1926 book "Wealth, Money (Virtual Wealth) and Debt" in 1926. Early modern interest in ecology and economics dates back to the 1940s in the work of K. William Kapp and Karl Polanyi and the 1960s in work by Kenneth Boulding and Herman Daly. However, the first organized meetings of modern ecological economists occurred in the 1980s. These began in 1982, at the instigation of Lois Banner,[11] with a meeting held in Sweden (including Robert Costanza, Herman Daly, Charles Hall, Bruce Hannon, H.T. Odum, and David Pimentel).[12] Most were ecosystem ecologists or mainstream environmental economists, with the exception of Daly. In 1987, Daly and Costanza edited an issue of Ecological Modeling to test the waters. A book entitled Ecological Economics, by Juan Martinez-Alier, was published later that year.[12] 1989 saw the foundation of the International Society for Ecological Economics and publication of its journal, Ecological Economics, by Elsevier. Robert Costanza was the first president of the society and first editor of the journal, currently edited by Richard Howarth.

European conceptual founders include Nicholas Georgescu-Roegen (1971), K. William Kapp (1950)[13] and Karl Polanyi (1944).[14] Some key concepts of what is now ecological economics are evident in the writings of E.F. Schumacher, whose book Small Is Beautiful – A Study of Economics as if People Mattered (1973) was published just a few years before the first edition of Herman Daly's comprehensive and persuasive Steady-State Economics (1977).[15][16] Other figures include ecologists C.S. Holling, H.T. Odum and Robert Costanza, biologist Gretchen Daily and physicist Robert Ayres. CUNY geography professor David Harvey explicitly added ecological concerns to political economic literature. This parallel development in political economy has been continued by analysts such as sociologist John Bellamy Foster.

The antecedents can be traced back to the Romantics of the 19th century as well as some Enlightenment political economists of that era. Concerns over population were expressed by Thomas Malthus, while John Stuart Mill predicted the desirability of the stationary state of an economy. Mill thereby anticipated later insights of modern ecological economists, but without having had their experience of the social and ecological costs of the Post–World War II economic expansion. As Martinez-Alier explores in his book the debate on energy in economic systems can also be traced into the 19th century e.g. Nobel prize-winning chemist, Frederick Soddy (1877–1956). Soddy criticized the prevailing belief of the economy as a perpetual motion machine, capable of generating infinite wealth—a criticism echoed by his intellectual heirs in the now emergent field of ecological economics.[17]

The Romanian economist Nicholas Georgescu-Roegen (1906–1994), who was among Daly's teachers at Vanderbilt University, provided ecological economics with a modern conceptual framework based on the material and energy flows of economic production and consumption. His magnum opus, The Entropy Law and the Economic Process (1971), has been highly influential.[18]

Articles by Inge Ropke (2004, 2005)[19] and Clive Spash (1999)[20] cover the development and modern history of ecological economics and explain its differentiation from resource and environmental economics, as well as some of the controversy between American and European schools of thought. An article by Robert Costanza, David Stern, Lining He, and Chunbo Ma[21] responded to a call by Mick Common to determine the foundational literature of ecological economics by using citation analysis to examine which books and articles have had the most influence on the development of the field. However, citations analysis has itself proven controversial and similar work has been criticized by Clive Spash for attempting to pre-determine what is regarded as influential in ecological economics through study design and data manipulation.[22] In addition, the journal Ecological Economics has itself been criticized for swamping the field with mainstream economics.[23] [24]

## Nature and ecology

A simple circular flow of income diagram is replaced in ecological economics by a more complex flow diagram reflecting the input of solar energy, which sustains natural inputs and environmental services which are then used as units of production. Once consumed, natural inputs pass out of the economy as pollution and waste. The potential of an environment to provide services and materials is referred to as an "environment's source function", and this function is depleted as resources are consumed or pollution contaminates the resources. The "sink function" describes an environment's ability to absorb and render harmless waste and pollution: when waste output exceeds the limit of the sink function, long-term damage occurs.[25]:8 Some persistent pollutants, such as some organic pollutants and nuclear waste are absorbed very slowly or not at all; ecological economists emphasize minimizing "cumulative pollutants".[25]:28 Pollutants affect human health and the health of the ecosystem.

The economic value of natural capital and ecosystem services is accepted by mainstream environmental economics, but is emphasized as especially important in ecological economics. Ecological economists may begin by estimating how to maintain a stable environment before assessing the cost in dollar terms.[25]:9 Ecological economist Robert Costanza led an attempted valuation of the global ecosystem in 1997. Initially published in Nature, the article concluded on $33 trillion with a range from $16 trillion to $54 trillion (in 1997, total global GDP was $27 trillion).[26] Half of the value went to nutrient cycling. The open oceans, continental shelves, and estuaries had the highest total value, and the highest per-hectare values went to estuaries, swamps/floodplains, and seagrass/algae beds. The work was criticized by articles in Ecological Economics Volume 25, Issue 1, but the critics acknowledged the positive potential for economic valuation of the global ecosystem.[25]:129

The Earth's carrying capacity is a central issue in ecological economics. Early economists such as Thomas Malthus pointed out the finite carrying capacity of the earth, which was also central to the MIT study Limits to Growth. Diminishing returns suggest that productivity increases will slow if major technological progress is not made. Food production may become a problem, as erosion, an impending water crisis, and soil salinity (from irrigation) reduce the productivity of agriculture. Ecological economists argue that industrial agriculture, which exacerbates these problems, is not sustainable agriculture, and are generally inclined favorably to organic farming, which also reduces the output of carbon.[25]:26

Global wild fisheries are believed to have peaked and begun a decline, with valuable habitat such as estuaries in critical condition.[25]:28 The aquaculture or farming of piscivorous fish, like salmon, does not help solve the problem because they need to be fed products from other fish. Studies have shown that salmon farming has major negative impacts on wild salmon, as well as the forage fish that need to be caught to feed them.[27][28]

Since animals are higher on the trophic level, they are less efficient sources of food energy. Reduced consumption of meat would reduce the demand for food, but as nations develop, they tend to adopt high-meat diets similar to that of the United States. Genetically modified food (GMF) a conventional solution to the problem, presents numerous problems – Bt corn produces its own Bacillus thuringiensis toxin/protein, but the pest resistance is believed to be only a matter of time.[25]:31 The overall effect of GMF on yields is contentious, with the USDA and FAO acknowledging that GMFs do not necessarily have higher yields and may even have reduced yields.[29]

Global warming is now widely acknowledged as a major issue, with all national scientific academies expressing agreement on the importance of the issue. As the population growth intensifies and energy demand increases, the world faces an energy crisis. Some economists and scientists forecast a global ecological crisis if energy use is not contained – the Stern report is an example. The disagreement has sparked a vigorous debate on issue of discounting and intergenerational equity.

# Η οικογένεια μου